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MINERALOGY AND PETROGRAPHY.[1]

PETROGRAPHICAL NEWS.—In a recent number of *Tschermak's Mittheilungen*[2] Mr. Hyland gives a most interesting and detailed account of the lavas of Kilimandjaro, a volcano in eastern equatorial Africa, and of the rocks in its vicinity. Pegmatite, gneiss, amphibolite, basalt-obsidian. limburgite, nepheline- and feldspathic-basalts, tephrite, basanite, tufas, and other fragmental rocks are described. The basalt-obsidian was taken for andesite glass by Bonney,[3] whereas it really contains no augite—the mineral regarded as augite by Bonney being olivine. Among the limburgites three types are recognized. In one porphyritic olivine predominates over augite ; in a second the olivine is subordinate to augite and hornblende ; in the third hornblende is absent and augite is more abundant than olivine. The first and second kinds are closely allied to the feldspathic basalts, and the third to the nepheline-basalt. The olivine in these rocks contains a large number of inclusions of magnetite, augite, and spinel. It is zonally developed and is frequently surrounded by a rim of augite needles. The feldspathic basalts embrace hornblendic varieties, in which the hornblende is corroded and surrounded by an opacitic rim, composed of augite, magnetite, and olivine, and porphyritic varieties in which the large prophyritic crystals are anorthite. The nepheline-basanites are especially interesting because of the occurrence in them of anorthoclase so well developed that Hyland was enabled to determine its optical properties with great accuracy. This mineral is undoubtedly triclinic. Its extinction on the basal plane varies between 0° and 3½°, and on the orthopinacoid between 5° and 6°. Its specific gravity is 2.63. Freed from impurities and analyzed it yielded :

SiO_2	Al_2O_3	CaO	K_2O	Na_2O	H_2O
61.3	23.1	3.02	5.34	7.11	.09

A leucite basanite contains almost ideally developed leucite crystals—the first discovered in Africa.[4] The other rocks described in the paper present no features of especial interest.—An important contribution to the study of the younger nepheline rocks has recently been made by Stock,[5] of the University of Leipzig, who has thoroughly investigated the material composing the basalt hills near Löbau, Saxony. This material comprises nepheline- and plagioclase-basalt, and nepheline-dolerite. The latter rock has been classed by Rosenbusch[1] among the nephelinites because of the supposed non-existence of olivine in it. The nepheline rocks have been erupted since the beginning of Tertiary time and are older than the plagioclase-basalt, which occurs in them in the form of dykes. The normal constituents of the nepheline rocks are augite, olivine, nepheline, apatite, biotite, and magnetite. The dolerite contains these as idiomorphic crystals in a groundmass composed of microlites of the same minerals and plagioclase in a devitrified base. In the finer grained variety the nepheline occurs principally as the interstitial substance between the other constituents. In both varieties this mineral possesses a tendency to pass into natrolite, phillipsite, and stilbite. The olivine is often so filled with magnetite that its true nature can be distinguished only with great difficulty. Twins of this mineral parallel to $P\breve{\infty}$ are not rare. Apatite is abundant, and frequently contains inclusions of the groundmass. Rubellan was discovered in a large number of sections, and hyalite and aragonite were found filling druse cavities. Both varieties of the nepheline rock are regarded as portions of the same magma. The dolerite is over the basalt, and is supposed to have cooled first. Inclusions of it are common in the underlying rock. Foreign inclusions, found also in this rock, consist of augite and sanidine, of which the former is usually on the exterior. Other common constituents of these inclusions are hematite, green spinel, and orange-colored rutile. The plagioclase-basalt contains quartz inclusions surrounded by rims of augite crystals.—Prof. Judd[2] calls attention to the fact that petrographical classification is based on the qualitative and not the quantitative determination of the constituents of rock masses. He shows that rocks composed of the same minerals may have widely varying compositions, even when their groundmass is approximately the same. Five examples of hypersthene andesites having the same mineralogical composition are taken, and it is shown that their content of silica ranges from 51.8% to 70%. The fact that the same minerals are found in rocks possessing such differences in composition is explained by supposing them to have crystallized in the earlier stages of the rock's solidification and then to have been separated from the residual magma, and finally to have recombined with this in proportions different from those in which they first occurred. Since the residual portion is much more acid than the individualized portion, it is easy to imagine rocks of any degree of acidity to have been formed by the mingling of the two portions in different amounts. The effect of the presence of water in lowering the fusing point of a rock is also discussed, in relation to its bearing on volcanic phenomena.

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[1] Edited by Dr. W. S. Bayley, Colby University, Waterville, Me.
[2] Min. u. Petrog. Mitth., x., p. 203.
[3] Report Brit. Ass., 1885, p. 682.
[4] Cf. Amer. Naturalist, Nov., 1888, p. 1024.
[5] Min. u. Petrog. Mitth., ix., p. 429.

MINERALOGICAL NEWS.—*Note.*—In the mineralogical notes for the current year the crystallographic axes will always be represented by the italicized small letters, *a, b, c,* and the axes of elasticity by the italicized capitals *A, B, C,* the latter indicating respectively the axes of greatest, mean, and least elasticity.—*New Minerals.*—*Sulphohalite* is a transparent, pale greenish-yellow mineral, crystallizing in the form of a dodecahedron, that was obtained from a drill-hole at the depth of thirty-five feet below the surface of the alkaline deposit at Borax Lake, California. It was associated with *hanksite,* and only one specimen was secured. The only two other specimens known to exist are in the collection of Mr. Bement, of Philadelphia. The mineral has been examined by Messrs. Hidden and Mackintosh.[1] Its specific gravity is 2.489, and its hardness 3.5. Its composition is represented by Na_2 ($\frac{3}{4}$ SO_4. $\frac{1}{4}$ Cl_2) or 3 $Na_2SO_4 + 2 Na Cl$, a formula analogous to that of the rare mineral *connellite,* which is thought to be a copper sulphato-chloride.—*Auerlite* is a new thorium mineral from the zircon mines in Henderson County, N. C. It is described by Messrs. Hidden and Mackintosh[2] as occurring in disintegrated granite and gneissic rocks, intimately associated with *zircon,* and frequently implanted upon this mineral in parallel position. The color of the new mineral on a fresh fracture varies between a lemon-yellow and a brownish-red. Its weathered exterior is of a dull yellowish-white. It has a waxy lustre, is subtranslucent to opaque, and is very brittle. Its hardness is 2.5–3, and its specific gravity 4.422–4.766. In crystallization it is tetragonal with the simple P and ∞ P faces. Its composition corresponding to $ThO_2 \left\{ \begin{matrix} SiO_2 \\ \frac{1}{3} P_2O_5 \end{matrix} \right\} H_2O$ is :

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[1] Mikroskopische Physiographie, ii., 1887, p. 791.

[2] Geol. Magazine, Jan., 1888, p. 1.

$H_2O.CO_2$	SiO_2	P_2O_5	ThO_2	Fe_2O_3	CaO	MgO	Al_2O_3
11.21	7.64	7.46	70.13	1.38	.49	.29	1.10

Auerlite thus appears to be a *thorite* in which part of the SiO_2 has been replaced by P_2O_5—the first recorded replacement of this kind in mineralogical literature.—Two new *sulphantimonites* are reported by Mr. Eakins[3] from Colorado. The first was found at the Domingo mine, Gunnison County, in aggregates of small acicular dull grayish-black crystals in the cavities of a gangue composed of siliceous material and calcite. Its analysis yielded :

Ag	Cu	Pb	Fe	Mn	Sb	S	Gangue
tr.	tr.	39.33	1.77	tr.	36.34	21.19	.52

corresponding to $(Pb\ Fe)_3\ Sb_4\ S_9$. The second is also found in little groups of crystals, of a bright steely-gray color. The individual crystals are larger than those of the first mineral, and occur together with pyrite and sphalerite in a siliceous gangue. Their composition is $Pb_5\ Sb_4\ S_{11}$, resembling *freieslebenite* in which the silver has been replaced by lead. Analysis gave :

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[1] Am. Jour. Sci., Dec., 1888, p. 463.
[2] Ib., p. 461.
[3] Ib., p. 450.

Ag	Pb	Fe	Sb	S (calculated.)
tr.	55.52	tr.	25.99	18.98

General.—Scacchi[1] has published a complete catalogue of the minerals occurring at Mount Vesuvius. He divides them into (1) crystallized minerals occurring in pieces of foreign rock cast up during the eruptions of Monte Somma and the earlier eruptions of Vesuvius; (2) those forming lava bombs; (3) those occurring in the Monte Somma conglomerate, as a result of contact action; (4) those produced in the fumaroles by sublimation; (5) those formed in the lava during its cooling; and (6) those present on the walls of the amygdaloidal cavities in the lava. One hundred and twenty five mineral species are briefly described, and the name of the writer first mentioning them is given. The catalogue will prove of great convenience to collectors in the region and to those in charge of collections embracing many Vesuvian specimens.—Brezina[2] would add *tellurite* to the group comprising the oxides *claudetite* and *valentinite*. Crystals obtained from a porous sandstone at Facebaja were measured and found to be orthorhombic with $a : b : c = .4566 : 1 : .4693$. The predominant faces are $\infty P_{\breve{\infty}}$, $\infty P_{\breve{2}}$, $\infty P_{\breve{4}}$, ∞P and P, and the plane of the optical axes is $\infty P_{\bar{\infty}}$.—In the limestone near Bagnères de Bigorre, France, are little crystals of black *albite*, which, according to Lacroix,[3] have the following composition :

SiO_2	Al_2O_3	Na_2O	CaO	Ign	Specific gravity
67.04	20.45	10.57	.65	1.30	2.563

—Limur[4] describes a *staurolite* crystal from Moustoir-Ac, Morbihan, France, which consists of a core, composed of quartz and staurolite material, surrounded by two zones of staurolite, one with a granular structure, and the other with a fibrous structure, due to the arrangement of little needles perpendicular to the prismatic faces of the crystal.

NEW BOOKS.—RUTLEY'S "ROCK-FORMING MINERALS."[5]—This little volume constitutes an excellent book for beginners in the study of microscopical geology. It includes an introduction to the methods made use of in the investigation of the optical and other physical properties of minerals, discusses the theory of polarized light, explains what is meant by "optical axes," "bisectrices," double refraction, etc., describes the polarizing microscope and other instruments used in the examination of minerals, and gives the principal characteristics of those minerals which enter into the composition of rocks. The explanations of the phenomena presented by sections of minerals when observed in polarized light, are given with great clearness, with the aid of good figures, most of which are new. The second part, which deals with the properties of the individual minerals, is not as full as is Mr. Idding's translation of Rosenbusch's manual, but is entirely sufficient for all the purposes of students. Although a most excellent text-book for colleges, Mr. Rutley's work is hardly full enough in its special part for those who desire to make a specialty of petrography as an important aid in geological work. For those who wish merely to become acquainted with the methods of the science, there is no better book in any language.

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[1] Neues Jahrb. f. Min., etc., 1888, ii., p. 123.

[2] Ref. N. J. B., 1888, i., p. 206.

[3] Bull. Soc. Franc. de Min.; xi., p. 64.

[4] Ib., xi., p. 61.

[5] Rock-Forming Minerals. By Frank Rutley. With 126 ills. and 252 pp Thos. Murby, 3 Ludgate Circus Buildings, London, 1888.

"DAS MINERALREICH,"[1] the fifth volume of Lenze's Natural History Series, has been revised and brought up to date. In its present shape it is a handy little volume of five hundred and forty-four pages. It treats of the universal and special properties of minerals in a manner adapted to the wants of general readers and others, who are desirous of becoming acquainted with these substances, but who are unwilling to enter into their technical study. In the special part a large amount of space is devoted to those properties of the various minerals which make them suitable for economic use. As a consequence this portion of the book is much more interesting than the corresponding part in most text-books. In general style "Das Mineralreich" reminds one of Quenstedt's Mineralogie.

CROSBY'S "TABLES FOR THE DETERMINATION[2] OF COMMON MINERALS," has a great advantage over all other similar tables in common use, in that it deals only with those minerals with which the student is likely to meet in his every-day work. The determinative methods are based upon the physical properties rather than upon the blowpipe characteristics of the individual species. The tabulation is carefully done, and the little book will surely be welcome in those schools which are not provided with complete sets of blowpipe apparatus.

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[1] Das Mineralreich. Bearbeitet von Dr. Otto Wünsche. V. Auf. Gotha, Thieanmanns Hofbuchhandlung, 1887. 544 pp., 16 Taf.

[2] Second Edition. By W. O. Crosby. Boston, 1888.